Review of Managerial Science
https://doi.org/10.1007/s11846-019-00333-8

REVIEW PAPER

Digital innovation and venturing: an introduction into the digitalization of entrepreneurship

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Received: 18 February 2019 / Accepted: 19 February 2019
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Abstract
This special issue follows the 2018 Global Innovation and Knowledge Academy (GIKA) Conference, which took place at the Catholic University of Valencia "San Vicente Mártir" in Spain from June 25th to 27th, 2018. As the eighth of its kind, the 2018 GIKA conference continued to attract the attention of scholars from around the world. The subject of this special issue—*Digital Innovation and Venturing*—had its own track at the GIKA conference, which served as a first-round review of some of the submissions to the journal. The special issue was also open for external submissions. As a result, this special issue includes seven contributions on the digitalization of entrepreneurship, encompassing important topics like digital business models, crowdfunding, and the sharing economy.

Keywords Digitalization · Innovation · Venturing · Entrepreneurship · Sharing economy · Crowdfunding

1 Introduction

In the last decade, companies from all manner of industries have been putting into practice actions that explore and exploit new digital technology innovation (Matt et al. 2015). Looking at the companies that are implementing digital business strategies highlights not only the organizational initiatives that are being implemented, but also "how technology affords individual entrepreneurship" (Majchrzak et al. 2016, p. 273).

The ongoing digital transformation, i.e. the deep and accelerating transformation of processes, activities and competences of companies (Bohnsack et al. 2018;

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Published online: 25 February 2019

Pesch et al. 2018), allows for taking advantage of changes and entrepreneurial opportunities. The rapid growth of digital technologies sets enormous change in motion. The inclusion of digital technologies into a business context implies huge challenges for companies, yet at the same time, promising opportunities, going as far as to the Schumpeterian (1934) destruction of whole industries and business models and the subsequent emergence of entirely new business models based on revolutionary innovation (Richter et al. 2017). In this sense, the benefits of the digital transformation include improvements on productivity (and sales), innovation in value creation and in the development of customers' interaction (Matt et al. 2015; Bouncken et al. 2019).

Today, digitalization can be regarded as one of the core topics that companies and the world economy have to cope with (Laudien et al. 2018). Anybody interested in current developments will have heard about digitalization and can at the very least address some issues about what they associate with the term. Given the numerous implications and developments which are caused by this phenomenon, it is important for entrepreneurs to be aware of related outcomes and connections (Kraus et al. 2018; Ferreira et al. 2019).

However, digitalization has not only brought new developments to entrepreneurship; existing business models are also facing a huge shift towards digital environments (Mithas et al. 2013). In addition to the new businesses being created out of the opportunities that digitalization presents, existing branches and businesses face a shift from offline to online business, creating "digital entrepreneurship" as a new form of entrepreneurial activity (Niemand et al. 2017). To give this term a definition, "digital entrepreneurship is a subcategory of entrepreneurship in which some or all of what would be physical in a traditional organization has been digitized" (Hull et al. 2007, p. 293).

Numerous opportunities for entrepreneurial activity are created through digitalization, and entrepreneurs need to be aware of these opportunities in order to be ready for sustainable innovations (Richter et al. 2015b). Many scholars have already analyzed developments and outlined issues in relation to digital entrepreneurship. As a result, most of them now focus on a more narrow topic, or sub-topic, within their research on the subject (e.g., Hull et al. 2007; Richter et al. 2015a; Nambisan 2017).

In this vein, Kraus et al. (2018) recently conducted a qualitative literature review of "digital entrepreneurship" by analyzing 35 contributions on the topic. The purpose of the study was to provide clusters of sub-topics within the field, which resulted in the following six categories: (1) digital business models, (2) digital entrepreneurship process, (3) platform strategies, (4) digital ecosystems, (5) entrepreneurship education, and (6) social digital entrepreneurship. As their review showed, digitalization brought a major shift to the way in which entrepreneurs conduct their business activities today. Not only do business models and their various possible forms and characterizations get shaped around their digital potential, but in fact many current forms of business did not exist prior to these modern advances in digital technology. Thus, numerous new opportunities have been created for entrepreneurs, and both the success factors and challenges for digital entrepreneurial activities are increasingly being analyzed by scholars.

In recent years, companies from all industries have implemented initiatives to put digital innovation into practice. However, there are few scientific studies about this new challenge, and as the aforementioned authors conclude in their analysis: "Research on digital entrepreneurship is still in its infancy" (Kraus et al. 2018, p. 21). This bring us to this special issue, publishing seven current research articles related to "Digital Innovation and Venturing", and thereby attempting to contribute to the further growth of the research stream and the connected academic discourse.

2 Relevance of the topic: the status quo

To visualize the overall relevance of the topic and the status quo of current research, we undertook a bibliometric analysis (Lawani 1981; White and McCain 1989).

According to the *Web of Science* database, there are 641 scientific documents that analyze in some way the concepts of "digital transformation", "digital innovation", "digital venturing" or "digital entrepreneurship". Narrowing this down further, if we focus only on the areas of management, business, economics and operations research, we have 188 documents. These documents include articles, notes, letters and reviews, as is the general practice in this method (Tur-Porcar et al. 2018). The total citations are 1552 and the h-index is 16.

To conduct the searches we used the Boolean operator (OR) and the following keywords: "digital innovation*", "digital transformation*", "digital ventur*" and "digital entrepre*". The research was conducted in January 2019.

Figure 1 shows the number of publications related to these concepts in recent years. We can see that the number of publications has increased noticeably in the last 4 years, with almost 70% of the total publications having been published in the last 2 years alone.

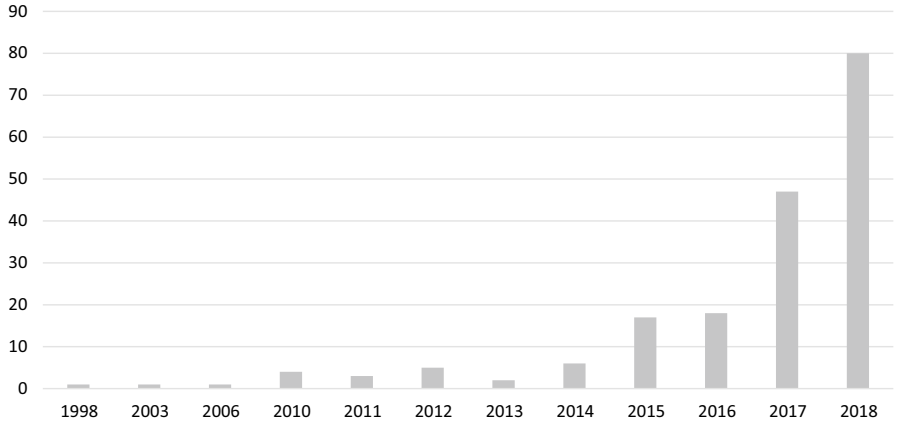

Fig. 1 Number of publications per year

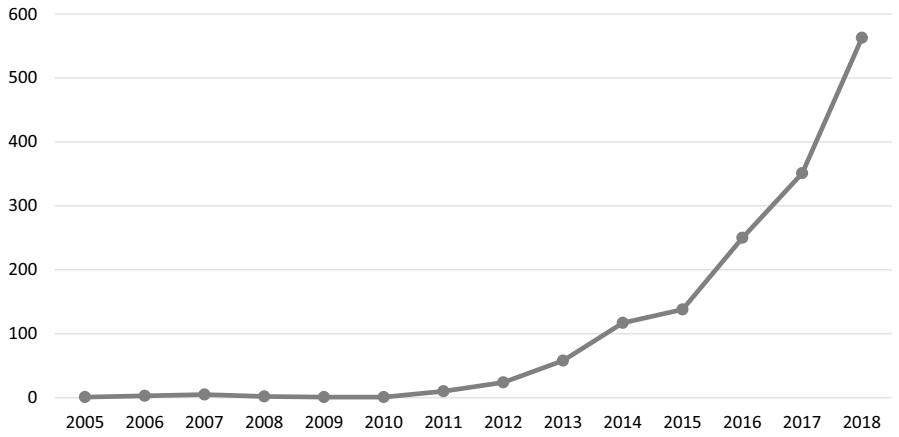

Fig. 2 Sum of total number of citations per year

Table 1 Number of citations per year

Year	TP	TC	H	≥ 100	≥ 50	≥ 25	≥ 10
2010	4	396	4	2	2	2	4
2011	3	12	3	0	0	0	0
2012	5	377	5	2	2	3	4
2013	2	18	2	0	0	0	0
2014	6	93	4	0	1	1	2
2015	17	341	8	1	1	3	5
2016	18	83	5	0	0	0	2
2017	47	170	8	0	0	1	5
2018	80	31	3	0	0	0	0

The first citations of this concept appeared in 2005, however, as is evident from Fig. 2, the citations have increased exponentially in the past year proving that the concept is gaining more and more attention by academics.

The first article referencing this concept was published in 1998, having used the term “digital entrepreneur”. However, there were no further publications regarding the concept until 2003 and 2006 (with one manuscript in each year). In 2010, the concept was first introduced in academia (Table 1).

As evidenced in Table 1, there are already five articles with more than 100 citations. These articles will be analyzed in the subsequent tables. Table 1 also clearly highlights the exponential increase in the number of publications over the last 2 years.

Due to its size, the USA is the most productive of countries in terms of output, however, the concept is gaining traction in England and Sweden where the total citations per article is higher than that of the USA, meaning that although there are less publications from these countries, these publications are highly cited (Tables 2, 3).

Table 2 Top 10 most cited papers

	TC	Title	Authors	Year	TC/year
1	214	The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research	Yoo, Youngjin; Henfridsson, Ola; Lyytinen, Kalle	2010	26.75
2	196	Service innovation: a service-dominant logic perspective	Lusch, Robert F.; Nambisan, Satish	2015	65.33
3	188	Organizing for Innovation in the Digitized World	Yoo, Y; Boland, RJ; Lyytinen, K; Majchrzak, A	2012	31.33
4	154	The Digital Transformation of Healthcare: Current Status and the Road Ahead	Agarwal, R; Gao, GD; DesRoches, C; Jha, AK	2010	19.25
5	112	Let a Thousand Flowers Bloom? An Early Look at Large Numbers of Software App Developers and Patterns of Innovation	Boudreau, K. J.	2012	18.67
6	68	Digital innovation as a fundamental and powerful concept in the information systems curriculum	Fichman, R. G.; Dos Santos, B. L.; Zheng, Z.	2005	5.23
7	44	Reconfiguring Boundary Relations: Robotic Innovations in Pharmacy Work	Barrett, M; Oborn, E; Orlikowski, WJ; Yates, J	2012	7.33
8	37	Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation	Nylen, D.; Holmstrom, J.	2015	12.33
9	30	Unpaid crowd complementors: The platform network effect mirage	Boudreau, Kevin J.; Jeppesen, Lars B.	2015	10.00
10	26	Digital innovation management: reinventing innovation management research in a digital world	Nambisan, S; Lyytinen, K; Majchrzak, A; Song, M	2017	26.00

Table 3 Top 5 most influential countries

	Country	TP	TC	H	TC/TP	≥100	≥50	≥25	≥10
1	USA	42	1079	12	0.29	4	5	7	14
2	Germany	65	35	5	0.08	0	0	0	1
3	England	23	276	8	0.35	1	1	4	6
4	Sweden	15	284	5	0.33	1	1	2	3
5	Switzerland	15	30	3	0.20	0	0	0	0

Table 4 Top 5 most productive and influential institutions

R	Institution	Country	TP	TC	H	TC/TP	≥50	≥25	≥10	≥1
1	U. of Applied Sciences and Arts Northwestern Switzerland	Switzerland	7	0	0	0.00	0	0	0	0
2	U. of Liechtenstein	Liechtenstein	7	24	3	3.43	0	0	0	5
3	Massachusetts Inst. of Tech (MIT)	USA	5	51	2	10.20	0	1	2	4
4	U. of Warwick	England	5	13	2	2.60	0	0	0	3
5	Case Western Reserve University	USA	4	429	3	107.25	2	3	3	4

Regarding Table 4, it is important to highlight that all the publications from the University of Applied Sciences and Arts Northwestern Switzerland are from 2018, explaining the lack of citations to date. It also reaffirms the interest that is being taken in the digital concept in recent years, from institutions that now seem to be specializing in that topic.

As we can observe, the topic of digitalization in connection with entrepreneurship is gaining more and more importance overall.

3 Contributions

The GIKA conference accepted 33 submissions on the topic "Digital Innovation and Venturing", where it was possible to submit either an extended abstract or a full paper. Submission was possible either via the conference, or independently submitted directly to the journal. For those that were submitted via GIKA 2018, the two reviews for the conference track served as a first round review. 31 full papers were then submitted in the next round via the *Review of Managerial Science* online submission system. Regardless of how they were submitted, all entries for this special issue had to go through an additional review process totaling three rounds, following the conference. This process required approval from at least two anonymous reviewers in order to be selected for publication in the journal. Ten articles made it into a third and fourth round of revisions, and ultimately seven articles were finally accepted for publication in this special issue.

Using the clusters developed for digital entrepreneurship by Kraus et al. (2018), this special issue offers a wide overview of the topic, displaying the first

three of the identified domains with two articles on crowdfunding, two on the sharing economy (cluster "platform strategies"), another two on innovative/digital business models (cluster "digital business models") and one on digital marketing strategies (cluster "digital entrepreneurship process").

The first contribution, by Cayetano Medina-Molina, Manuel Rey-Moreno, J. Augusto Felício and Inmaculada Romano Paguill, exemplifies the profile of participants in crowdfunding initiatives among users of collaborative platforms. The article investigates the link between two intrinsic factors (innovativeness and social capital) and participation in crowdfunding initiatives by analyzing a sample of 422 users of collaborative platforms. As a result, the authors find that the two intrinsic factors are linked with participation in crowdfunding initiatives and that differentiation in participation among users of collaborative platforms corresponds to the adoption of new services (higher for crowdfunding participants) and bridging social capital (lower for crowdfunding participants). The results obtained suggest an incorporation of crowdfunding projects in vertical thematic financial platforms in order to take advantage of the effect of social capital and innovative capacity to increase participation and maintain diversity of effective financing formulas. The study therefore contributes to the current literature on crowdfunding by identifying the critical importance of determining the characteristics of its participants for achieving superior results (Medina-Molina et al. 2019).

The second contribution to this special issue also looks at crowdfunding. In their article "Of early birds and phantoms: how sold-out discounts impact entrepreneurial success in reward-based crowdfunding", Martin Adam, Michael Wessel and Alexander Benlian illustrate that the presence or absence of a sold-out reward option in the form of an early-bird offer affects the choice behavior of potential backers. Using an online experiment with 229 subjects simulating the pledging process for a crowdfunding campaign which raises funds for the publication of a book, it is found that potential backers choose the undiscounted version of a reward more often if a discounted, sold-out reward (phantom option) is displayed. This effect is significant when the phantom option has a high discount, but not significant when the phantom option has a low discount. In contrast to the traditional perspective that sold-out options negatively impact sales, this experimental study suggests that, in reward-based crowdfunding, sold-out rewards may increase the chances of success, if considered and applied strategically (Adam et al. 2018).

The third contribution of this special issue, by Barbara Del Bosco, Roberto Chierici and Alice Mazzucchelli, is entitled "Fostering entrepreneurship: an innovative business model to link innovation and new venture creation" and deals with the connection between academic innovation and new venture creation. The authors present the case study of the Italian company e-Novia, who developed an innovative business model connecting academic innovation and entrepreneurship. In this way, the company operates as an "enterprises factory" and develops academic innovations, founding start-ups that exploit these innovations. This research highlights the fact that the e-Novia business model differs from other forms of support to entrepreneurship and shows how the company solves the critical issues typical of each phase of the academic entrepreneurial process. The findings have practical implications for

academic innovators, as they highlight the potentialities and peculiarities of an innovative form of support to academic entrepreneurship (Del Bosco et al. 2018).

The article "Understanding the influence of digitalization on service firm business model design: a qualitative-empirical analysis" is written by Sven M. Laudien and Robin Pesch. This research asks the question how service firm business model designs change due to digitalization and how a possible change does affect the service firm knowledge base. The results of this study show that digitalization imposes an effect on the design of service firm business models. However, this effect is not as radical as expected; service firms seem to make use of digitalization as a means of improving traditional methods of value creation, delivery, and capture. These findings contrast with the existing literature of the processual, dynamic nature of strategic change. Thus, the results open a new line of research: Can service firm digitalization be viewed as a continuous process? (Laudien and Pesch 2018).

The next contribution, by María Teresa Ballestar, Pilar Grau-Carles and Jorge Sainz is entitled "Predicting customer quality in e-commerce social networks: a machine learning approach". This research deals with the design of recommendation-based digital marketing strategies by providing companies with a predictive model. This study uses real data to evaluate and propose an empirical model, where the authors are able to predict how consumer behavior changes over time, how that happens, and what role the network plays in those variations. Companies can use the proposed tool to compete on a level playing field, increasing their profitability. In this sense, companies will be able to offer new applications (that will help upgrade old marketing techniques) to customers, or develop new techniques that will provide solutions to meet customers' needs (Ballestar et al. 2018).

Thomas Clauss, Peter Harengel and Marianne Hock write about "The perception of value of platform-based business models in the sharing economy: determining the drivers of user loyalty". The authors follow the demand-side strategy idea and contribute to the field of research that recognizes customers as essential contributors to business models and strategy development. Their findings offer a guide to the platform managers that have already reached a level of maturity in the platform life cycle (Clauss et al. 2018).

In the final contribution of this special issue, entitled "Customer satisfaction and repurchase intention theory for the online sharing economy", Kun-Huang Huarng and Ming-Feng Yu explore consumer behavior for the sharing economy in the hotel industry. The variables analyzed were service quality, experience, customer satisfaction and continuous purchase. On the one hand, from a practitioner's point of view, the comparison between AirBnB and hotels shows how these two different services can compete with each other. On the other hand, the use of the two methods shows various strengths in providing empirical results: coefficients for AirBnB and hotels can be compared, however, there are multiple relationships from the qualitative analysis with structural associations (Huarng and Yu 2018).

With this special issue, we hope to have made another step forward in the discourse on the rising topic of "Digital Innovation and Venturing". The increasing amount of scholarly evidence makes it clear that the digital transformation—i.e. the integration of digital technology into all areas of a business, fundamentally changing how the business operates and delivers value to its customers by taking advantage of

the changes and entrepreneurial opportunities coming with it (Hinings et al. 2018)—is the greatest challenge for companies of all sizes and ages today. Yet the inclusion of digital technologies into a business context also bears elements of Schumpeterian (1934) destruction of whole industries and business models as well as the emergence of totally new business models based on revolutionary innovation. In this editorial article, we have identified several core discourses in the area which will serve as a foundation for future research opportunities. We hope that these will help other researchers to engage in increasingly ambitious projects concerning Digital Innovation and Venturing.

Acknowledgements The guest editors of this special issue thank the participants of the 2018 Global Innovation and Knowledge Academy (GIKA) Conference, held at the Catholic University of Valencia "San Vicente Mártir" in Spain from June 25th to 27th, 2018. We are especially grateful to Professors Ralf Ewert and Wolfgang Kürsten, Editors-in-Chief of the "Review of Managerial Science" for offering this special issue titled "Digital Innovation and Venturing". We also thank all reviewers for providing constructive comments and suggestions to help the authors improve their papers.

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